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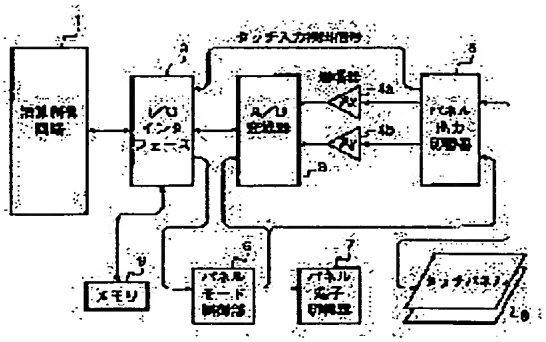
(54) COORDINATE INPUT DEVICE

(57)Abstract:
PURPOSE: To simultaneously input plural points by obtaining the coordinate value of a second point from the output potential of a resistance film based on an arithmetic expression stored in a storage means when it is judged as a two-point simultaneous input state by a judgement means.
CONSTITUTION: When the film potential of an (x) axis and a (y) axis is detected, A/D conversion is performed by an A/D converter 3 first. When the A/D conversion is completed, output through an I/O interface 2 to an arithmetic control circuit 1 is performed. Further, after fetching data, sampled one-point input coordinate data immediately before are loaded from a one-point coordinate memory. The arithmetic control circuit 1 uses the data as one of the data at the time of two-point input and computes the coordinate value of the second point. In such a manner, since a touch panel 8 is used and the coordinate data (the two unknown numbers of an (x) coordinate and a (y) coordinate) of the second point at the time of a two-point input mode are obtained by an arithmetic operation, this coordinate input device capable of the two-point input is obtained by simple constitution.



* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the device for inputting coordinates which detects the coordinates position pushed with a pen or a finger.
[0002]
[Description of the Prior Art]As a conventional device for inputting coordinates, the thing using ** resistance film system (pressure-sensitive method), ** electric capacity connection type, electromagnetic induction and an electromagnetism transfer method, ** ultrasonics usage method, the method by ** stylus pen, ** light interception method touch panel, etc. is known, for example.
[0003]** Two or more the glass plates or resin films (henceforth "the electric conduction film") which have a resistance film are constituted in piles, and said resistance film of two sheets contacts and energizes the device for inputting coordinates of a method in the directed part.
By detecting the potential in the point of contact in that case, the resistance from a base level to a point of contact is detected, a contact place is conferred, and it changes into a position coordinate.

[0004]** The device for inputting coordinates of a method comprises the glass or resin of one sheet which has a transparent electrode pattern of line form or the shape of a loop coil in the x direction and y direction of an input screen, or two sheets or more, By processing the signal detected in the directed dedicated pen and the form through electromagnetic waves, the latest transparent electrode pattern is specified as said directions part, a directions part is conferred, and it changes into a position coordinate.
[0005]** The device for inputting coordinates of a method detects vibration which installed two or more vibration detecting means (sensor) on the tablet which is an input screen, and was inputted by the oscillating input means, from the time and propagation velocity which the propagation took, computes the distance to a sensor and an oscillating input means, and detects input position coordinates.
[0006]** The device for inputting coordinates of a method detects a CRT scanning signal with the stylus pen contacted on CRT, pinpoints the position on a raster pattern from the detected scanning timing, and confers a position coordinate.
[0007]** Specify touch input coordinates by which light sensing portion the touch input was detected and detected beam-of-light interception by the device for inputting coordinates of a method spreading optical beams, such as infrared rays, around like meshes of a net on the display surface of a display, and interrupting it with a finger.
[0008]There are some which can be stuck as a memo, or the information machines and equipment which constituted the above devices for inputting coordinates and displays, such as

LCD, in one in piles can input gesture as a command by pen-shaped pens and pencils on an input screen, or can input a character, can perform character recognition, and can perform a character input.

[0009]Although there are some which are used as a "virtual keyboard" by displaying a keyboard picture in the above-mentioned information machines and equipment, In this case, when actually using it as a substitute of a keyboard, to input with a finger is required, therefore as for the device for inputting coordinates to be used, the resistance film system of the aforementioned ** is used.

[0010]

[Problem(s) to be Solved by the Invention]However, especially in the above conventional devices for inputting coordinates, in the aforementioned **, **, and **, since the dedicated pen was used at the time of a coordinate input, there was a problem that the input of those other than a dedicated pen was impossible.

[0011]Especially, in the aforementioned **, **, and **, since only one point inputted coordinates at a time, there was a problem that the plural coordinates of the wide range could not be inputted, simultaneously.

[0012]There are the following problems in the information machines and equipment using the above devices for inputting coordinates.

[0013]First, when input gesture as a command, or input a character and it is stuck as a memo, or performing character recognition and performing a character input. Although a pen-shaped coordinate indicator is desirable, when inputting text data (a lot of alphabetic data) at high speed, as usual, a keyboard can input quickly and it is convenient. However, since the resistance film system of ** will be used as above-mentioned supposing it uses the above "virtual keyboard" as a substitute of a keyboard in this case, there is a problem that the input of two or more points becomes impossible on a "virtual keyboard."

[0014]If the input of two or more points becomes impossible on a "virtual keyboard", usage which types [another] while pressing the [shift] key and the [cntrl] key like the usual keyboard cannot be done here, Since it becomes impossible to input only one point at a time once pointing out the [shift] key etc. as another key is pointed out once again, It is necessary not only to change operation of a finger, but the case where it could not input occurred still like the shortcut key to the actual keyboard, it did not become a replacement means of the keyboard thoroughly, i.e., there was a problem that it could not change, with the means of a lot of [at high speed] data input.

[0015]Then, this invention is made in order to solve such a technical problem, and it is a thing. The purpose is to provide the device for inputting coordinates which can be inputted.

[0016]

[Means for Solving the Problem]In order to solve an aforementioned problem, this invention has the following means.

[0017]The device for inputting coordinates according to claim 1 has a two-layer resistance film to which voltage is impressed to each both ends, and device for inputting coordinates of this invention which calculates a coordinate value of a position inputted by press on this resistance film from output potential of said resistance film according to that input state is characterized by that it comprises the following.

The selected area for choosing said input state set as a part on said resistance film.

A decision means which judges a two-point simultaneous input state by which an input of the 2nd point is continuously made on said resistance film an input of the 1st point being carried out into the one-point input state as which one point is inputted by press outside said selected area on said resistance film, and said selected area.

A storing means which stores said coordinate value of the 1st point.

Said 1st point and each coordinates position of the 2nd point at the time of said input of the

2nd point being made, By memory measure which memorized a computing equation which derives said coordinate value of the 2nd point which consists of an expression of relations of output potential of said resistance film at the time of said input of the 2nd point being made, and a coordinate value stored in said storing means, and said decision means. An arithmetic control means which calculates said coordinate value of the 2nd point from output potential of said resistance film based on said computing equation when judged as said two-point simultaneous input state.

[0018]The device for inputting coordinates according to claim 2 said arithmetic control means, When judged as said two-point simultaneous input state by said decision means, after performing reversal control of direction of voltage impressed to said resistance film according to a coordinate value stored in said storing means, said coordinate value of the 2nd point is calculated from output potential of said resistance film based on said computing equation.
[0019]The device for inputting coordinates according to claim 3 has a two-layer resistance film to which voltage is impressed to each both ends, and device for inputting coordinates of this invention which calculates a coordinate value of a position inputted by press on this resistance film from output potential of said resistance film according to that input state is characterized by that it comprises the following.
The selected area for choosing said input state set as a part on said resistance film.
A decision means which judges a two-point simultaneous input state by which an input of the 2nd point is continuously made on said resistance film an input of the 1st point being carried out into the one-point input state as which one point is inputted by press outside said selected area on said resistance film, and said selected area.
A storing means which stores said coordinate value of the 1st point.
An output potential processing means to amplify this removed output potential further after removing a predetermined output component of output potential of said resistance film according to a coordinate value stored in this storing means, Said 1st point and each coordinates position of the 2nd point at the time of said input of the 2nd point being made, By memory measure which memorized a computing equation which derives said coordinate value of the 2nd point which consists of an expression of relations of output potential of said resistance film at the time of said input of the 2nd point being made, and a coordinate value stored in said storing means, and said decision means. An arithmetic control means which calculates said coordinate value of the 2nd point from output potential of said resistance film based on said computing equation via said output potential processing means when judged as said two-point simultaneous input state.

[0020]
[Function]According to the device for inputting coordinates according to claim 1, an arithmetic control means calculates the coordinate value of the 2nd point from the output potential of said resistance film based on the computing equation memorized by the memory measure, when judged as a two-point simultaneous input state by a decision means.
[0021]According to the device for inputting coordinates according to claim 2, an arithmetic control means, When judged as a two-point simultaneous input state by a decision means, after performing reversal control of direction of the voltage impressed to said resistance film according to the coordinate value stored in said storing means, the coordinate value of the 2nd point is calculated from the output potential of said resistance film based on the computing equation memorized by the memory measure.
[0022]According to the device for inputting coordinates according to claim 3, an arithmetic control means calculates said coordinate value of the 2nd point from the output potential of said resistance film based on said computing equation via said output potential processing means, when judged as a two-point simultaneous input state by a decision means.

[0023]
[Example]Hereafter, the example of this invention is described in detail with reference to drawings.
[0024](The 1st example) Drawing 1 is a block diagram showing the structure of the device for inputting coordinates in this example.
[0025]The arithmetic control circuit 1 as an arithmetic control means where this device performs various arithmetic control, It has I/O interface 2, A/D converter 3, the amplifiers 4a and 4b, the panel output switcher 5, the panel mode controller 6, the panel terminal switcher 7, the touch panel 8, and the memory 9 that memorized various kinds of information, including various programs, a computing equation, etc., and is constituted.
[0026]The touch panel 8 comprises the electric conduction film 20 as a resistance film on top of which the x-axis film 20a (an electrode arranges in parallel with the y-axis) and the y-axis film 20b (an electrode arranges in parallel with a x axis) were laid two sheets, as shown in drawing 2.
[0027]This electric conduction film 20 has done resistance distribution uniformly.
Towards furthermore intersecting perpendicularly, the electrode 21 to which voltage is impressed has the electrode 21a for grounds to both ends, and is provided in them, respectively.

[0028]Since the touch panel 8 has the structure where only the portion which was made to counter by each electric conduction side side of the electric conduction film 20 of two sheets, and was pushed with a finger, a pen, etc. contacts and output potential changes with change of a contact position, it is detected and coordinates are acquired.
Thereby, voltage is impressed to the one electric conduction film 20, and the output is taken out from the electric conduction film 20 which is one more and which counters.
The output from this touch panel 8 is performed by outputting a high-level signal to the panel output switcher 5, and it is inputted into the arithmetic control circuit 1 via the I/O interface 2 as a touch input detecting signal.
[0029]Drawing 2 shows the state in the case of impressing voltage to the transverse direction of the x-axis film 20a, and taking out an output from the y-axis film 20b which counters.
[0030]The panel terminal switcher 7 is changed so that current may flow, if the touch panel 8 has pressing operation with the panel mode controller 6.
[0031]The memory 9 has memorized the computing equation of the coordinate value of the 2nd point at the time of the two-point mode mentioned later.
[0032]The arithmetic control circuit 1 has two input states (mode) for performing coordinates data processing. That is, they are the two modes of the one-point input mode as an one-point input state which is accepted one point and inputted, and the two-point input mode (2 point-coordinates compute mode) as a two-point simultaneous input state which carries out a two-point simultaneous input.
[0033]The arithmetic control circuit 1 sets up arbitrarily the predetermined field which selection in the two modes takes on the touch panel 8.
An operation is performed in a two-point input mode until it changes to a two-point input mode and judges that he next has no touch input, only when the coordinate input of a predetermined field occurs at the time of an one-point input mode.

[0034]There is an one-point coordinate memory as a storing means in the inside of the arithmetic control circuit 1, the data which this one-point coordinate memory holds is not updated at the time of a two-point input, but data is updated only at the time of an one-point input.
[0035]The arithmetic control circuit 1 is provided with the touch input distinction mode for judging the existence of a touch of the touch panel 8.

The panel mode controller 6 is set up via I/O interface 2, when a touch input is carried out, each apparatus is controlled and a coordinates detection procedure is advanced.

[0036]The arithmetic control circuit 1 sets up the panel mode controller 6, and changes the panel terminal switcher 7, and this coordinates detection procedure chooses the output potential of the touch panel 8 by the panel output switcher 5, and is performed by changing into digital data with A/D converter 3 after amplification with the amplifier 4. As for this coordinates detection procedure, a x axis and the y-axis are performed twice.
[0037]The A/D conversion data acquired in this coordinates detection procedure has coordinates computed by two computing equations, said one-point input or a two-point input, mode = Different in the arithmetic control circuit 1 (it mentions later using a flow chart).
[0038]Drawing 3 expresses the potential distribution of the electric conduction film 20 of one sheet, and the isoelectric line is located in a line at equal intervals by drawing 3. When voltage was impressed, potential distribution at equal intervals arises and a certain point is pushed with a finger etc. into the field, the electric conduction film 20 changes output potential by the position, and changes output potential with the vertical position in drawing 3. That is, the same output is obtained if it is the same horizontal position.
[0039]Here, it is explained using drawing 4 and drawing 5 how this output is obtained.
[0040]When a B point is pushed, for example, distance (shortest distance to the electrode 21a for grounds) of Eo, and the position and base level which were pushed is set to x1 and only one point sets [the length of a panel transverse direction] the output voltage to Ex for Lxo and impressed electromotive force in drawing 4, it is x1=Ex/EoxLxo. -- (1)
It becomes. In an one-point input, a lateral position = x-coordinate detects directly from (1) type. The same may be said of a y-coordinate, voltage is impressed to changing panel impressed electromotive force 20b, i.e., a y-axis film, and a y-coordinate can be detected by taking out output potential from the x-axis film 20a.
[0041]Here, to a panel impression power supply, a direct current and exchange can be used and also it is detectable by a current diversion-of-river ratio besides potential.
[0042]At the time of a two-point input, using the coordinate data at the time of the last one-point input assumes the case where the device for inputting coordinates of this invention is used, as a virtual keyboard. When using it as a keyboard, there cannot be no operation which pushes two points (two keys are pressed) simultaneously. That is, usually it types [the case where another Roman alphabet key is usually pressed pushing shift key, and / another], pushing cntrlkey, and the operation which types [another] is natural, pressing one key also as operation of a finger (hand). Therefore, this device is a method which one input point does not move by immobilization mostly, but detects another input point as strange input data at the time of a two-point input (contact).
The point that two points are not inputted simultaneously at all is used.

[0043]Also after changing to two-point coordinate value compute mode, when the input of the 2nd point is not performed, the output potential obtained does not change. In that case, whether the two same coordinate values are outputted or only the coordinates of one point are outputted should just select according to a service condition.
[0044]Here, composition like drawing 2 explains what happens to output potential at the time of a two-point input. First, like drawing 4, when an A point and a B point are pushed simultaneously (i.e., when an input is two points), the courses of the current between an A point and a B point are two courses of the electric conduction film, the upper part and the bottom, 20 of two sheets. That is, it is pushed by sufficient pressure, and when it is so small that the contact resistance in the point of contact of the electric conduction film 20 of two sheets can be disregarded, the resistance between an A point and a B point serves as abbreviation half compared with the state where it is not pushed.

[0045]The isoelectric line at the time of a two-point input is shown in drawing 5. The isoelectric line has collapsed from the state of the sequence of a parallel straight line. Since the resistance for two points which is a point of contact decreases, the interval of the isoelectric line for two points has spread. Since resistance between A=B of the potential in a point of contact (A and B point) is about 1/2, the potential Ea of an A point is Ea=(deltax/2+x1)/(Lxo-deltax/2) xEo. -- (2)
Similarly, the potential Eb of a B point is Eb=x1/(Lxo-deltax/2) xEo. -- (3)
It becomes. Therefore, the output potential of the x-axis film 20a and the y-axis film 20b is not a value proportional to each coordinate value.
[0046]Next, the arithmetic method which searches for the coordinates of the 2nd point from output potential is explained. The output potential of the x-axis film 20a changes not only with x shaft position of two points but with the y shaft positions of two points. That is, output potential changes also with the positions on the axis of the y-axis film 20b for output extraction which counters. The potential in an A point and a B point does not turn into output potential. Since it is a typical figure, an extraction electrode position is the same position as the x-axis film 20a, but drawing 4 is making the electrode position of the electric conduction film 20 intersect perpendicularly and counter like drawing 2 actually. By the resistance film of the electric conduction film 20 of two sheets having the almost same resistance, and taking out with an A point, when the press in a point of contact is enough and contact resistance is small enough, if it of ya and a B point is set to yb, distance (shortest distance to an extraction electrode) with an electrode surface, Output potential Ex2 is Ex2=(ybxEa+yaxEb)/(ya+yb). -- (4)
Thus, it becomes like the output of a resistance bridge.
[0047]Similarly, the output at the time of impressing voltage to the y-axis film 20b (for [conventional] y-coordinate detection) is shown in a following formula.
[0048]
Ey2=(x2xE1+x1xE2)/(x1+x2) -- (5)
deltax=x2-x1 E1=(deltay/2+y1)/(Lyo-deltay/2) xEo E2=y1/(Lyo-deltay/2) xEo deltay=y2-y1 [however,] -- here shows what plotted the actual output potential at the time of the two-point input in the electric conduction film 20 to drawing 6 and drawing 7. Drawing 6 plots the output potential of a x direction, and drawing 7 plots the output potential of a y direction.
[0049]A known input point, i.e., the last input point at the time of an one-point input, is set to (x1, y1) as an input point of the 1st point, and the 2nd newly pushed point is set to (x2, y2). In drawing 6 and drawing 7, it is an output potential value at the time of a two-point input in case there is the 1st (x1, y1) point at the center of the touch panel 8, and the value of (x2, y2) and the output potential value (vertical axis) are using the standardized value on a graph. The coordinates of the center of the touch panel 8 are set to (0.5, 0.5) by standardization at this time.
[0050]An output is uniquely decided to the value of (x2, y2) as shown in the graph of drawing 6 and drawing 7. That is, two kinds of values (x2, y2) cannot be found from the output potential of the lot of the x direction at the time of a two-point input, and a y direction.
[0051]Therefore, since the coordinate data (x2, y2) of one more point can be found from an output potential value if the coordinate data loaded to the computing equation of the above (4) and (5) from an one-point coordinate memory is substituted, Thereby, the output to the host of this device, etc. can output two coordinate data, the coordinate data (x2, y2) for which it asked by the operation, and the coordinate data (x1, y1) used for the operation.
[0052]Next, operation of this example by the above-mentioned composition is explained focusing on operation of the coordinate computation by the arithmetic control circuit 1 using the flow chart of drawing 8 and drawing 9. Drawing 8 shows operation in an one-point input mode, and drawing 9 shows operation of 2 point-coordinates compute mode as a subroutine. By setting working [the following], especially, as long as there is no notice, the arithmetic

control circuit 1 shall carry out.

[0053]First, if a touch input is carried out to the touch panel 8 by a user's finger etc., the arithmetic control circuit 1 will change the panel terminal switcher 7, and will perform a touch input judging with touch input distinction mode (S1) (S2). Here, first, when a touch input occurs, in order to calculate an x-coordinate, the arithmetic control circuit 1 sets up the panel mode controller 6, changes the panel terminal switcher 7, and amplifies the output potential of the touch panel 8 with the amplifier 4. Then, A/D converter 3 starts the A/D conversion of this amplified output potential (S3).

[0054]next -- judging whether the A/D conversion completed the arithmetic control circuit 1 -- (S4) -- if it does not complete, operation of an A/D conversion is continued succeedingly. When it completes, A/D converter 3 is outputted to ********** 1 by considering the data after an A/D conversion as an x-coordinate output via the I/O interface 2 (S5).

[0055]If the output of an x-coordinate is completed, ********** 1 will start the A/D conversion for calculating a y-coordinate (S6). And it judges whether the A/D conversion was completed (S7), and if it does not complete, operation of an A/D conversion is carried out succeedingly. When it completes, it outputs to the arithmetic control circuit 1 by considering the data after an A/D conversion as a y-coordinate output via the I/O interface 2 (S8).

[0056]Next, it is distinguished whether the arithmetic control circuit 1 judged (S9) and a touch input in touch input distinction mode again, and the touch had ended it during coordinates detection procedure execution (S10). Since the obtained data is not reliable, either, if judged with a touch input not being carried out here (if the touch is completed in the middle of execution), the acquired data is repealed and is canceled (S11).

[0057]When the touch has not been completed yet, put the obtained coordinate value into the one-point coordinate memory in the arithmetic control circuit 1, and a memory value is updated (S12), When the coordinate value calculated by the operation judges whether it is in the field appointed beforehand (S13) and is in a predetermined region, it jumps to 2 point-coordinates compute mode (subroutine = drawing 9) (S14). When it is not a predetermined region, it is this and the flow of 1 time of an one-point input mode is ended.

[0058]If a coordinate value exists in a predetermined region and it is judged with a two-point input, it will jump to the subroutine of 2 point-coordinates compute mode of drawing 9.

[0059]First, detection of the film potential of a x axis will start an A/D conversion with A/D converter 3 (S16). (S15)

[0060]Next, it judges whether the A/D conversion was completed (S17), and if it does not complete, operation of an A/D conversion is carried out succeedingly. When it completes, it outputs to the arithmetic control circuit 1 via the I/O interface 2 (S18).

[0061]If the output of an x-coordinate is completed, the film potential of the y-axis will be detected (S19), and the A/D conversion for calculating a y-coordinate will be started (S20). Next, it judges whether the A/D conversion was completed (S21), and if it does not complete, operation of an A/D conversion is carried out succeedingly. When it completes, it outputs to the arithmetic control circuit 1 via the I/O interface 2 (S22). After incorporating data, the sampled last one-point inputted coordinate data is loaded from an one-point coordinate memory (23). This data is used for the arithmetic control circuit 1 as one data at the time of a two-point input, and it calculates the coordinate value of the 2nd point (24). When the operation was completed, a touch input is again distinguished like the time of an one-point input (S25) and a touch input occurs, procedure of drawing 6 is repeated and performed until a touch input is completed.

[0062]Since it cannot trust the data obtained (when the touch was completed in the middle of execution), either, if it judges with a touch input not being carried out here, the arithmetic control circuit 1 cancels the acquired data as invalid (S27), is this and ends the subroutine of 2 point-coordinates compute mode.

[0063]According to this example, the same touch panel 8 as the former is used by the above

composition, Since it asks for the coordinate data of the 2nd point at the time of a two-point input mode (two unknowns, an x-coordinate and a y-coordinate) by an operation, it has come out from the output potential data of the two electric conduction films 20 to realize with composition with an easy device for inputting coordinates in which a two-point input is possible.

[0064]Since the device for inputting coordinates which can be inputted two-point simultaneous is realized with easy composition, without changing especially a touch panel part, when this device is applied to the information machines and equipment which use a virtual keyboard, a actual keyboard and the virtual keyboard which alter operation does not change can be constituted.

[0065]The (2nd example), next the 2nd example of this invention are described.

[0066]This example is constituted like the 1st example of the above except panel terminal switcher 7 and arithmetic control circuit 1.

[0067]The panel terminal switcher 7 is simply constituted by electronic switches, such as FET, so that a switching action may change according to the value of an one-point coordinate memory. .

[0068]Since the home position of the coordinates which the panel terminal switcher 7 changes, simultaneously are acquired by an operation changes, the arithmetic control circuit 1 is constituted so that it may be further alike and coordinate transformation processing may be performed more after coordinates data processing.

[0069]Next, it is explained how the panel terminal switcher 7 is changed according to the value of an one-point coordinate memory.

[0070]Output potential in case coordinate data (x1, y1) is [(0.1, 0.1) the value of which = standardization was done] is shown in drawing 10 and drawing 11. Drawing 10 plots the output potential of a x direction, and drawing 11 plots the output potential of a y direction.

[0071]As compared with drawing 6 and drawing 7, as for drawing 10 and drawing 11, the output potential value is not changing a lot. The little of the amount of output potential value changes leads to the fall of the calculation resolution of the coordinate data at the time of asking by an operation (x2, y2). Although it is a grade which is actually satisfactory to use at the time of providing virtual data all over a touch panel, when a touch panel becomes large-sized and uses it for an input by using the part as a virtual keyboard, the low level of resolution becomes a problem.

[0072]The value of the output potential of the x-axis film 20a in case coordinate data (x1, y1) is (0.9, 0.9), and the y-axis film 20b is shown in drawing 12 and drawing 13. Drawing 12 plots the output potential of a x direction, and drawing 13 plots the output potential of a y direction.

[0073]This graph shows that output ranges more enough than the case of = (0.1, 0.1) and by extension, high resolution are obtained (x1, y1).

[0074]Here, the value of the coordinates on a actual graph notes changing by direction of the impressed electromotive force Eo of drawing 4. That is, if direction of Eo is reversed, x1=0.1 will be set to x1=0.9. therefore, = (x1, y1) (0.1, 0.1) -- like (x2, y2) — what is necessary is to change the panel terminal switcher 7 and just to obtain enough output ranges at the time of the coordinate value which leads to the fall of the calculation resolution at the time of asking

[0075]Therefore, a two-point input with high resolution is attained by the above-mentioned composition by changing the change of the panel terminal switcher 7, and direction of impressed electromotive force with the value of an one-point coordinate memory.

[0076]The (3rd example), next the 3rd example of this invention are described.

[0077]The configuration block figure of this example is shown in drawing 14.

[0078]This device forms the slicing circuits 10a and 10b which cut the DC component below the minimum output level of the touch panel 8 other than the composition of said 1st example, and the variable amplifiers 11a and 11b which made the amplifiers 4a and 4b variable, and is constituted.

[0079]This device by the above-mentioned composition takes the method of optimizing another detected range instead of the method of changing the impressed electromotive force by said 2nd example as a method of raising the resolution of output potential.
[0080]Namely, the thing acquired only for the output in a range [like drawing 8] in which this method is, If the value of an one-point coordinate memory is seen and the output change is in agreement with the channel range of an A/D conversion since it can judge, The output of the touch panel 8 is processed with the maximum amplification factor of the grade which uses that detection power serves as the maximum, and cuts the DC component below a minimum output level by forming the slicing circuits 10a and 10b, and is not saturated with the maximum output with the variable amplifiers 11a and 11b.
[0081]A device for inputting coordinates with thereby still higher calculation resolution is realized.
[0082]Since signal processing of a touch-panel output is devised according to an input position, when this device is applied to the information machines and equipment which use a virtual keyboard, even if the size of a virtual keyboard becomes small, a coordinate input with sufficient calculation resolution becomes possible.
[0083]
[Effect of the Invention]According to this invention, the following effects are done so as explained in full detail above.
[0084]According to the invention according to claim 1, since an arithmetic control means calculates the coordinate value of the 2nd point from the output potential of a resistance film based on the coordinate value of the 1st point, without adding a complicated device especially, it is easy composition and can realize the device for inputting coordinates which can be inputted two-point simultaneous. The device for inputting coordinates which can constitute by this a actual keyboard and the virtual keyboard which alter operation does not change can be provided.
[0085]According to the invention according to claim 2, since an arithmetic control means performs reversal control of direction of the voltage impressed to a resistance film according to the coordinate value stored in the storing means when judged as a two-point simultaneous input state by a decision means, it can raise the calculation resolution at the time of calculating the coordinate value of the 2nd point.
[0086]According to the invention according to claim 3, since an arithmetic control means calculates the coordinate value of the 2nd point via an output potential processing means in a two-point simultaneous input state, it can provide a device for inputting coordinates with still more sufficient calculation resolution.

[Translation done.]